Title: Quest for a Quilt

Brief Overview:

Our class has decided to make a quilt that will be sold during the November PTO in order to earn money for a predetermined purchase. Students will estimate the size of the quilt, demonstrate an understanding of part/whole relationships through original designs of quilt blocks, and cooperatively assemble the quilt blocks in a symmetrical manner. They also will be involved in dialogue, problem solving, mathematical reasoning, and assimilation to build consensus. They will write a friendly letter to a class that wishes to make a patchwork quilt, explaining the procedure and mathematical skills utilized.

Links to NCTM Standards:

- **Mathematics as Problem Solving**
  Students will demonstrate their ability to solve problems in mathematics by working in a cooperative atmosphere to create a patchwork quilt.

- **Mathematics as Communication**
  Students will demonstrate their ability to communicate mathematically by illustrating the relationship of fractional parts to the whole. Students will represent their data in a mathematical context. They will read, write, and discuss mathematics with appropriate language and the signs, symbols, and terms of the discipline. They also will write a friendly letter to a class that wishes to make a patchwork quilt, explaining the procedure and mathematical skills utilized.

- **Mathematics as Reasoning**
  Students will demonstrate their ability to reason mathematically by agreeing to the layout and design of the finished quilt. Students will need to defend their pattern arrangements verbally yet be willing to cooperate in order to complete the quilt in a timely manner.

- **Mathematical Connections**
  Students will demonstrate their ability to connect mathematics topics within the discipline and with history and literature through the reading of The Patchwork Quilt, The Coat of Many Colors, and Colonial Crafts for You to Make.

- **Number Concepts and Relationships**
  Students will demonstrate their ability to apply estimation strategies in computation, in measurement, and in problem solving. They will determine reasonableness of solutions. Students will demonstrate their ability to solve fraction and decimal problems.

- **Estimation**
  Students will demonstrate their ability to apply estimation strategies in determining the size of the quilt and the number of squares needed to make the quilt.

- **Whole Number Computation**
  Students will demonstrate their ability to compute using whole numbers when figuring out the amount of blocks needed to produce the quilt.

- **Geometry and Spatial Sense**
  Students will demonstrate their ability to see spatial relationships in the layout and design of the quilt blocks.

- **Measurement**
  Students will demonstrate and apply concepts of measurement using metric and customary measurements. They will estimate and verify measurement by determining the size of the quilt and the number of squares needed to form the specified size. Students will apply measurement to real-world problem solving situations.

- **Statistics**
  Students will demonstrate their ability to collect, organize, display data, and interpret information obtained from the displays of quilt blocks. They will complete a writing project based on statistical information.

- **Fractions and Decimals**
  Students will demonstrate and apply concepts of fractions, equivalent fractions, fractional parts of a whole, fractional parts of a set in the design, layout, and measuring of the quilt. They will use arithmetic operations to solve problems that include fractions and decimals.

- **Patterns and Relationships**
  Students will demonstrate their ability to recognize patterns and their numeric relationships from the data they obtain.

Grade/Level:

Grades 4-5

Duration/Length:

This unit will take a minimum of 5 class periods(45-60 minutes) to complete.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimating perimeter and area
- Patterning
- Fractions-equivalent and part/whole relationship
- Measuring
- Multiplication, Division, Addition, and Subtraction

- Symmetry
- Graphing
- Decimals (money)
- Components of a friendly letter

Objectives:

Students will:

- represent fractional parts of a whole on a geoboard and paper.
- be able to estimate the size of the finished quilt and the number of blocks needed.
- work in cooperative groups.
- design a quilt according to specific criteria.
- participate in a hands-on activity.
- use strategies within a group to produce a finished product.
- interpret patterns.
- identify equivalent fractions.
- calculate costs when given specific data
- write a friendly letter.

Materials/Resources:

Activity One

- The Patchwork Quilt by Valerie Flournoy
- Pattern blocks
- Centimeter graph paper
- Crayons, markers, or colored pencils
- Scissors
- Masking tape
- Blank paper

Activity Two

- Colonial Crafts for You to Make by Janet and Alex D'Amato
- Geoboard paper or graph paper
- Geoboards and rubber bands
- Rulers and scissors
- Masking tape
- Overhead geoboard 11" x 11"
- Overhead markers
- Student Resource Pages One and Two
- Teacher Resource Pages One to Four

Activity Three

- White poster board-one per group
- Crayons, markers, or colored pencils (As predetermined by the group consensus.)

Activity Four

- Unbleached muslin-one per student
- Fabric Crayons-one box per four students
- Coat of many Colors by Dolly Parton-book or tape if available

Activity Five

- Teacher Resource Sheet Five - Performance Assessment

Development/Procedures:

Each student will design a quilt block consisting of a whole divided into fractional parts. There will be groups of four-six students with each student designing his/her own block showing a variety of ways to divide a block into fractional parts.

Activity One: Set the stage

Read aloud The Patchwork Quilt by Valerie Flournoy**.** Discuss the book. Construct quilt blocks using pattern blocks and a blank sheet of paper. When finished with the design transfer pattern to graph paper and color using crayons, markers, or colored pencils. Cut out pieces and tape randomly on the wall. (Few details are given so that students will see the need for symmetry.)

Activity Two: Preliminary Design

1. Discuss the paper quilt. "What do you see?" Record responses on overhead. Reflect on feedback. Elicit that some have been divided into parts: some equally, some not.

2. On the overhead geoboard demonstrate dividing into halves. Shade half with marker.

3. Ask students to place rubber bands on their boards so they have ½ of the board inside the band but show different shapes than shown on the overhead. "How many different ways can you show ½?" Sketch on dot paper. (Student resource Page One)

4. Demonstrate ways to show various fractional parts (Teacher Resource Pages 1-4). Ask students to complete task, first on geoboard, then sketch favorite shape on dot paper. Distribute Student Resource Page One.

5. What fractional part of this block (on wall display -designate one specific block) was yellow, red, blue, etc.? After discussion have students agree on the size of each quilt block. Establish some criteria for a more reasonable, aesthetic, and pleasing effect.

6. Divide students into groups of 4-6, each focusing on a different fractional part.(Be very directive: "Group one will divide your blocks into halves, group two will divide your blocks into fourths, etc.") Then design quilt blocks using geoboards and rubber bands. Transfer designs to geoboard or graph paper using the media that was determined by the group. Post the quilt blocks in a space with predetermined dimensions.

7. During the last five minutes of class summarize the day's activities by reading Colonial Crafts for You to Make by Janet and Alex D'Amato pages 37-38.

8. Assign homework-Student Resource Page Two.

Activity Three: Group Consensus

Given 45 minutes students will work cooperatively to lay out and arrange the quilt using the block designs from previous class. Students must determine the appropriate measurement tools to facilitate their work. Justify their reasoning using mathematical terms.

"Return to the groups you were in yesterday." Distribute one sheet of white poster board to each group. Have students assign a number to each member of the group from 1-4. Beforehand write the job number assignments on the board.
Jobs assigned are:
1. Facilitator/Timekeeper -this person monitors the work of the group and is responsible to keep everyone on task. He/she should stop the group 15 minutes prior to the end of the period to permit time for oral presentations.
2. Recorder -this person records the reasoning the group used in deciding how to arrange the quilt blocks.
3. Reporter -this person reports the reasoning of the group to the class as a whole.
4. Graphics Designer -Plans and assigns tasks for the transfer of the pattern to the poster board.

After thirty minutes the timekeeper stops the work of the group and each group reporter presents their suggestion to the class along with the reasoning for the pattern chosen using mathematical terms. The class votes as to which quilt pattern they wish to use for the real quilt.

Activity Four: Implementation

Students work independently to transfer their pattern to fabric with fabric crayons on unbleached muslin that has been pre-cut by the teacher. Class time will not be utilized to assemble the quilt. This will be done by adult volunteers. If no parent volunteers are available blocks can be finished as potholders by the students.

While students are finishing quilt blocks read or play Dolly Parton's Coat of Many Colors.

Performance Assessment:

Activity Five:

1. Distribute Performance Assessment.
   "Look at the quilt block and estimate what fractional part of the whole square each color represents. Record your estimate in the space below the pattern block. Be sure you can justify your reasoning behind your estimation. " Allow 10-15 minutes.

2. "Using geoboard, tiles, or graph paper calculate the actual fractional part each color represents. Write a number sentence to show how the fractions combine to form the whole on the line provided below."Allow 10-15 minutes.

3. "On the back of your paper make a bar graph to demonstrate the fractional part of the whole that is represented by each color. Be sure to include a title and label the graph correctly." Allow 10-15 minutes.

Rubric

	Placement of Data	Title	Axes
3	Completely accurate	Appropriate title provided	Data at equal intervals; axes labeled
2	Partially accurate	Adequate title provided	Data at unequal intervals; axes labeled
1	Inaccurate	Title missing or inappropriate	At least one axis not labeled

Source: From materials developed by the Maryland Assessment Consortium Adapted by Office of Assessment, Baltimore County Public Schools 7/97

4. Distribute Student Resource Page Six.
   "Look at the quilt square, if each small square cost $0.10, calculate the value in dollars and cents for each color. What would the total cost of the quilt be? Write each as a number sentence." Allow 10-15 minutes.

5. "Use the rest of the class period and follow the directions stated on the paper."
   Allow 20-30 minutes. (If additional time is needed students may have another class period to complete letters.)

Rubric

	Five Parts of Letter	Sequential Order	Mathematical Terminology
3	Completely accurate-all five parts	Logical progression	Consistent use of terms
2	Partially accurate-3-4 parts	Mostly correct	Infrequent use of terms
1	Inaccurate-0-2 parts	Illogical order	No terms used

Extension/Follow Up:

Resources

- Internet address: www.acpl.lib.in.us/Childrens_Services/
  Children's Services--Kids and Quilts
- Stars Galore and Even More by Donna Poster
- Kids Can Quilt by Sally Schneider
- Compute a Design by Patricia Wright
- Magic Stack n Whack Quilts, by Bethany Reynolds
- Geometric Shapes and Beginner Fractions by Jo E. Moore
- Quilting, Now and Then by Karen Bates Willing
- With Needle and Thread: A Book About Quilts by Raymond Bial
- The Quilt-Block History of Pioneer Days by Mary Cobb
- The Log Cabin Quilt by Ellen Howard
- The Canada Geese Quilt by Natalie Kinsey-Warnock

Literature

- Have students write their own quilt story.
- Read a biography of Dolly Parton.
- Have students find a book from the library on quilting. Suggested titles are:
  The Patchwork Girl of Oz by L. Frank Baum
  Eight Hands Round: A Patchwork Alphabet by Ann Whitford Paul
  Sunflower Sal by Janet S. Anderson
  The Patchwork Quilt by Nicola Bayley
  My Grandmother's Patchwork Quilt by Janet Bolton
  Sam Johnson and the Blue Ribbon Quilt by Lisa Campbell Ernst
  Apricots at Midnight by Adele Geras
  Luka's Quilt by Georgia Guback
  Sweet Clara and the Freedom Quilt by Deborah Hopkinson
  The Quilt by Ann Jonas
  The Quilt Story by Tony Johnston
  The Boy and the Quilt by Shirley Kurtz
  Bizzy Bones and the Lost Quilt by Jacqueline Briggs Martin
  The Seasons Sewn by Ann Whitford Paul
  The Keeping Quilt by Patricia Polacco
  Tar Beach by Faith Ringgold
  Cemetery Quilt by Kent and Ann Ross
  Patchwork Tales by Susan L. Roth
  Selina and the Bear Paw Quilt by Barbara Smucker
  Ernest and Celestine's Patchwork Quilt by Garbrielle Vincent
  The Dream Quilt by Amy Zerner

Math

- Design another quilt using octagons, hexagons, circles, etc.
- Estimate the cost of fabric, bunting, batting, thread, etc.
- Plan strategies for fund raising projects.
- Hold a bake sale. Divide items into fractional parts. Use decimals for figuring the amount of each item. Make posters advertising the sale.
- Calculate the cost of a quilt block based on an assigned value for each color.

Language Arts

- Write letters to your Grandmother asking her about her experience with quilts or family history.
- Write letters to Tanya from The Patchwork Quilt and share your experiences in making a quilt.
- Write letters to Grandmother from The Patchwork Quilt and share your experiences in making a memory quilt.
- Write letters to another class and share your experiences in making a quilt.

- Write a letter to someone in a nursing home and ask questions about their memories of quilts and family history.

History

- Make a time line of the history of quilting.
- Study the colonial time period and the art of quilt making.
- Make a memory quilt of the school year.
- Study the history of quilting and share what you learned with the class.

Project

- Conduct a bake sale to earn the money for the quilt materials.
- Raffle the quilt as a school fund raiser.
- Decide what you would like to use the money for.
- Write a letter to the principal asking for specific purposes for which the money earned could be used.
- Write a letter to the PTO to request a loan to cover the cost of the materials.
- Make a lap blanket for a person in a nursing home, or for your own Grandmother.
- Make pot holders.

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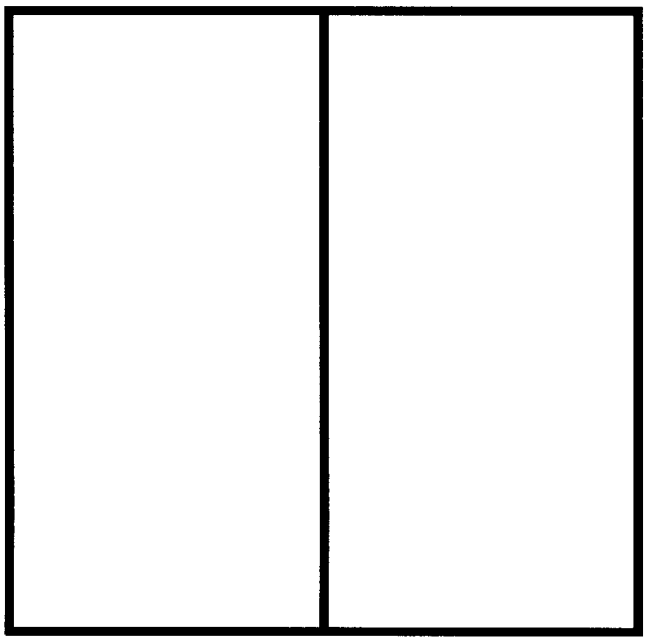
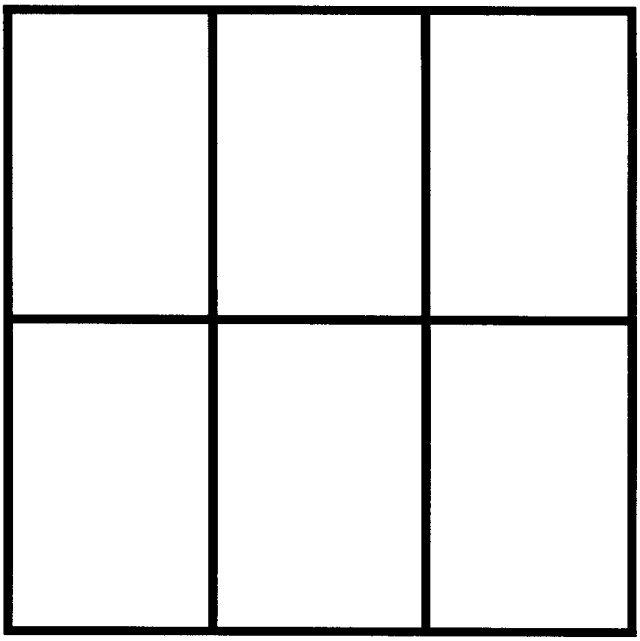
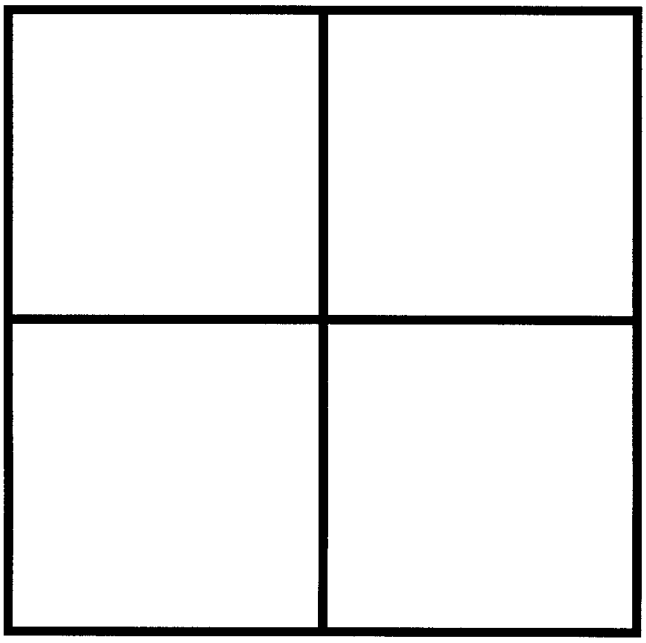
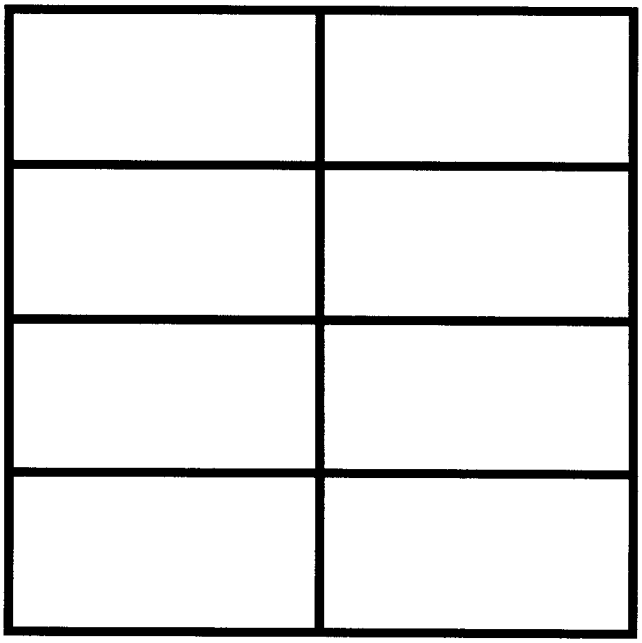
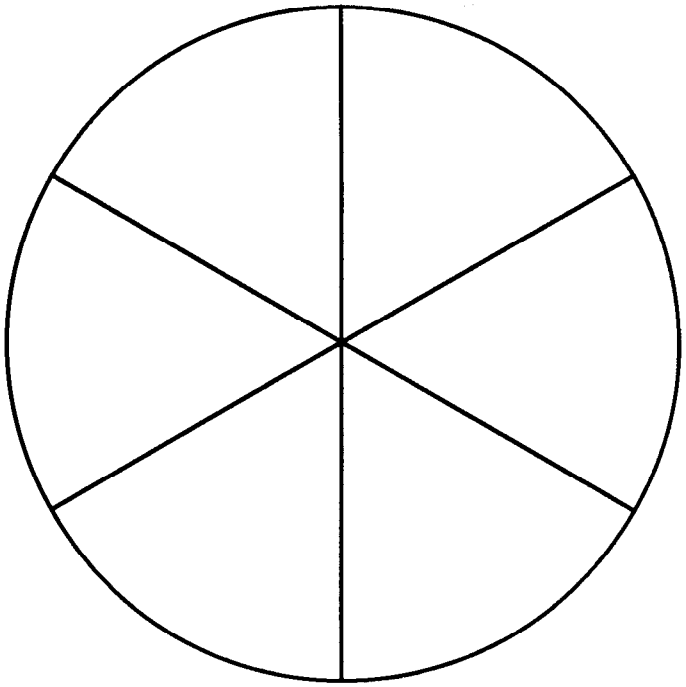
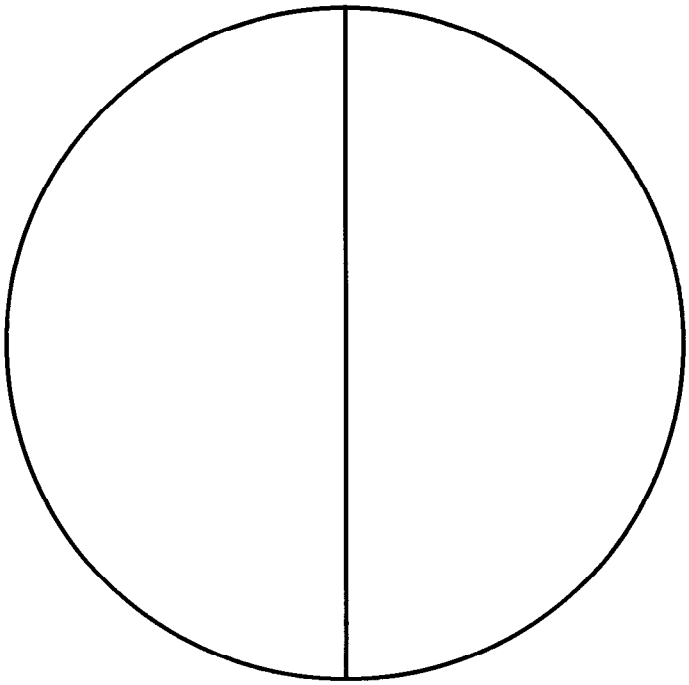


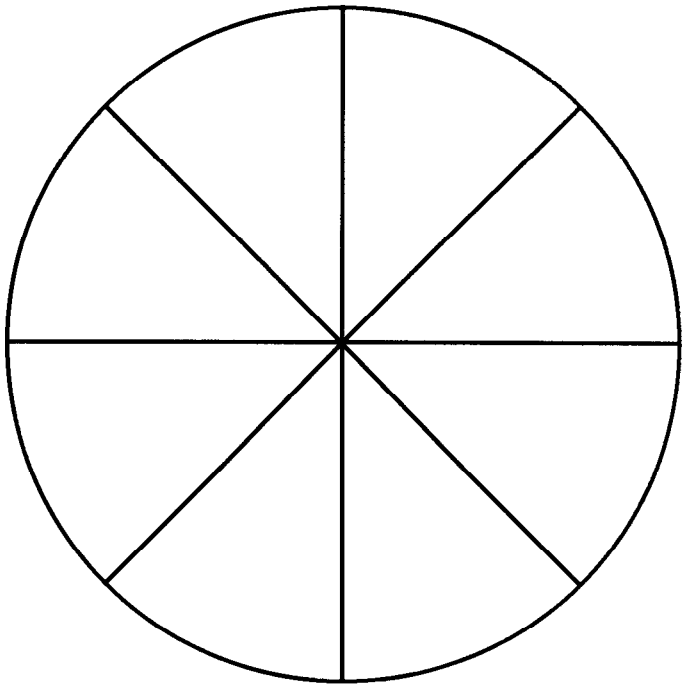


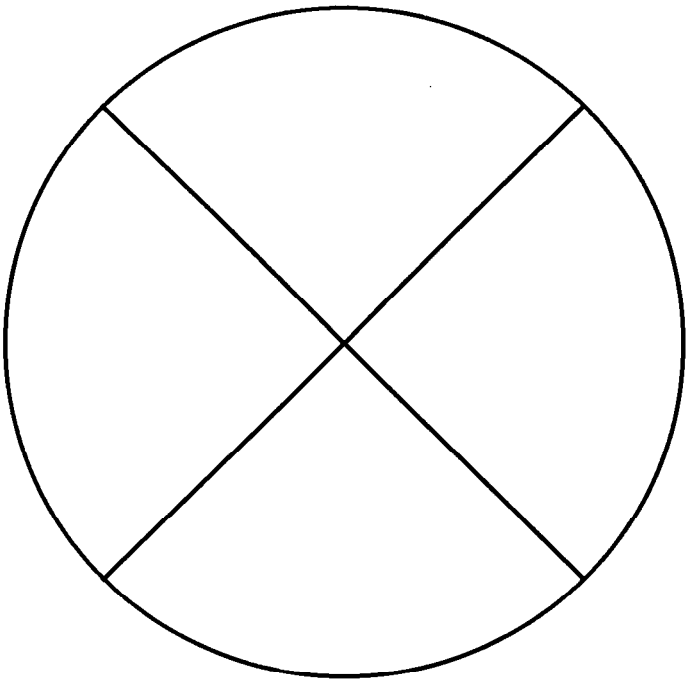


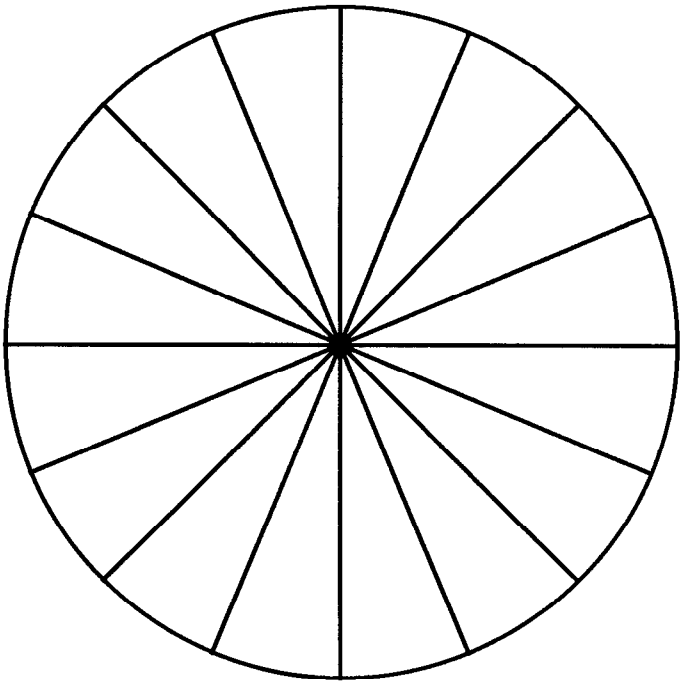


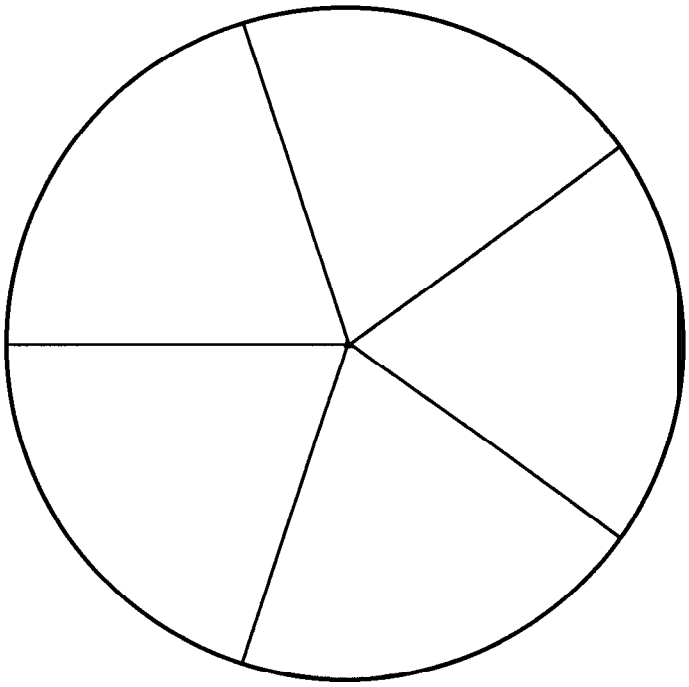


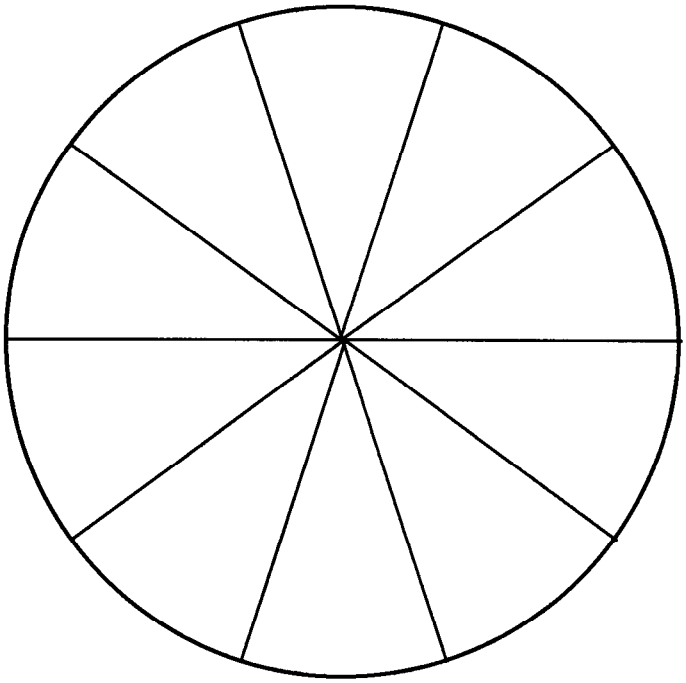


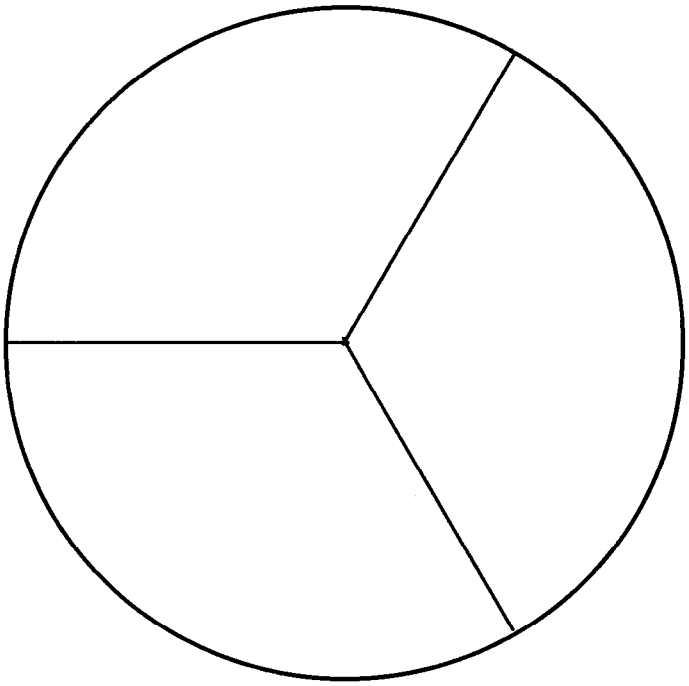


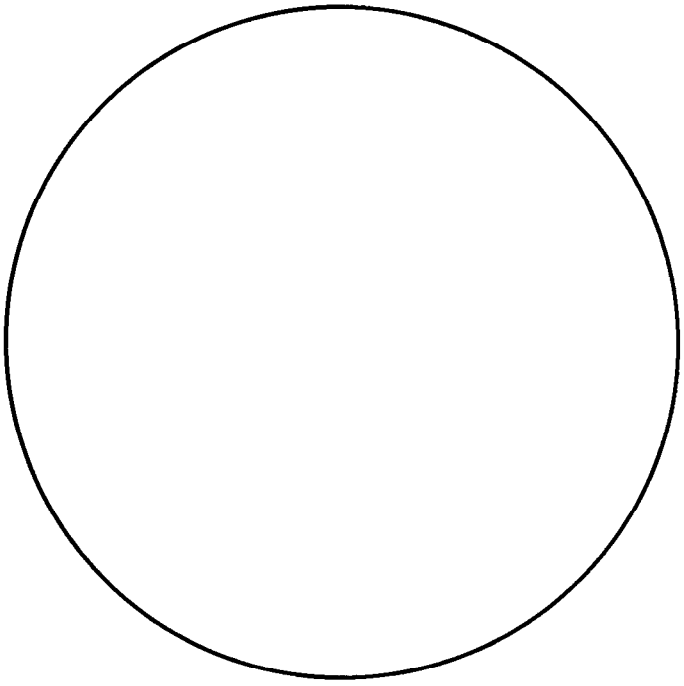






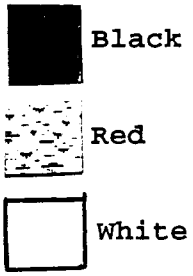


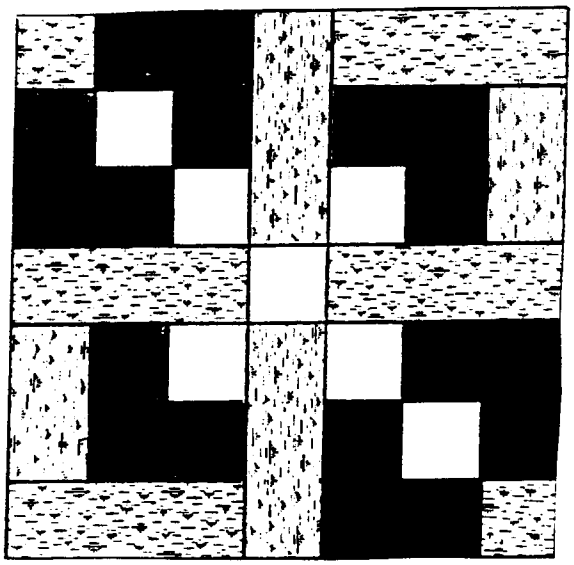




Name: **Answer Key** Date: _____

Performance Assessment





1. Look at the quilt block and estimate what fractional part of the whole square each color represents.

   1/4(2/8) Black

   5/8 Red

   1/8 White

2. Justify your estimation:

   There is more red than any other color, therefore, it will be a larger portion. When added together, we will have to have a whole.

3. Using geoboard, tiles, or graph paper calculate the actual fractional part each color represents.

   Black 18/49

   Red 24/49

   White 7/49=1/7

4. Write a number sentence to show how the fractions combine to form the whole.

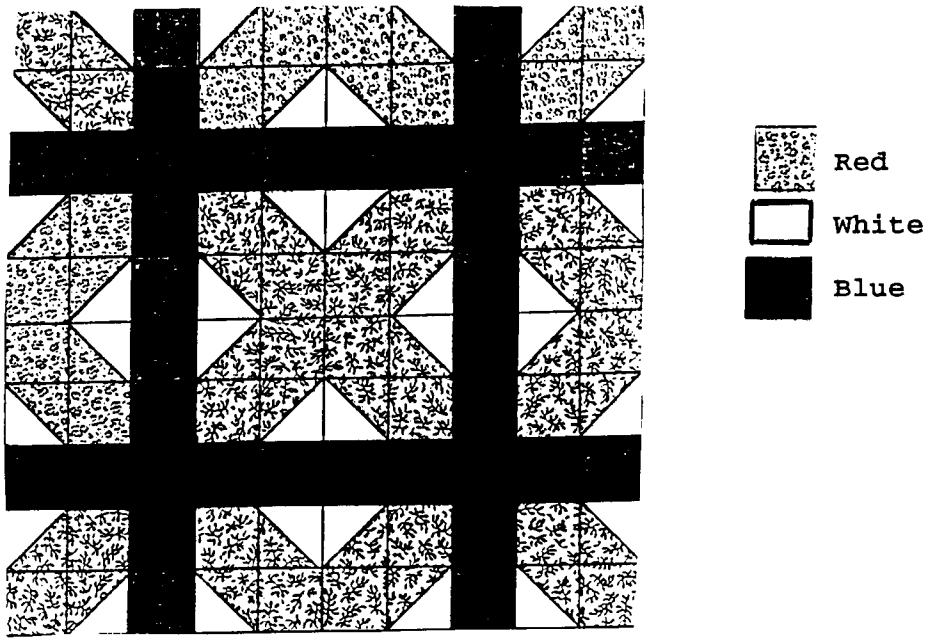
18/49 + 24/49 + 7/49 = 49/49 = 1

5. In the space provided make a bar graph to demonstrate the fractional part of the whole that is represented by each color. Be sure to include a title and label the graph correctly.

Black is 18 units, red is 24 units, and white is 7 units.

Name: _____ Date: _____

Performance Assessment



6.Look at the quilt square, if each small square cost $0.10 calculate the value in dollars and cents for each color. What would the total cost of the quilt be? Use a number sentence to show how you got your answers.

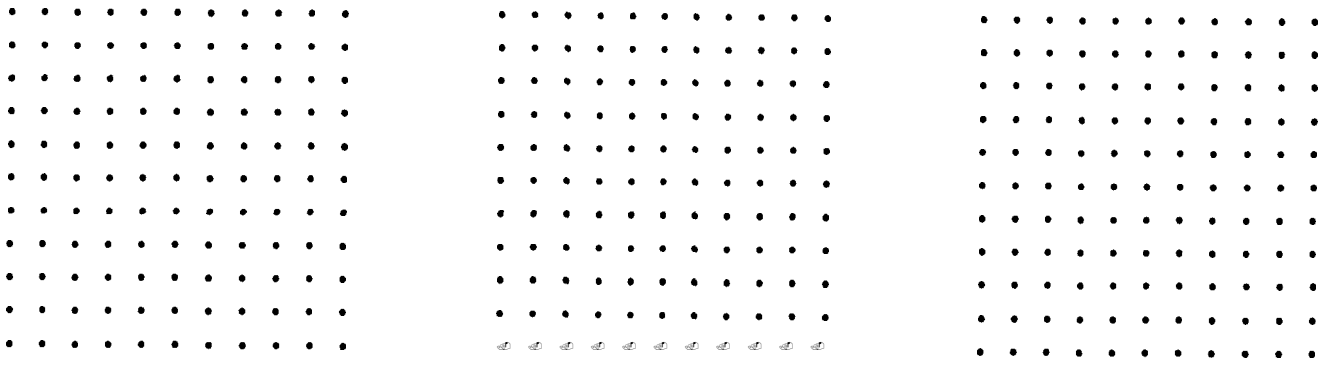
	Cost	Number Sentence
Red	**$4.80**	**48 x .10 = $4.80**
White	**$1.60**	**16 x .10 = $1.60**
Blue	**$3.60**	**36 x .10 = $3.60**

Total Cost **$4.80 + $1.60 + $3.60 = $10.00**

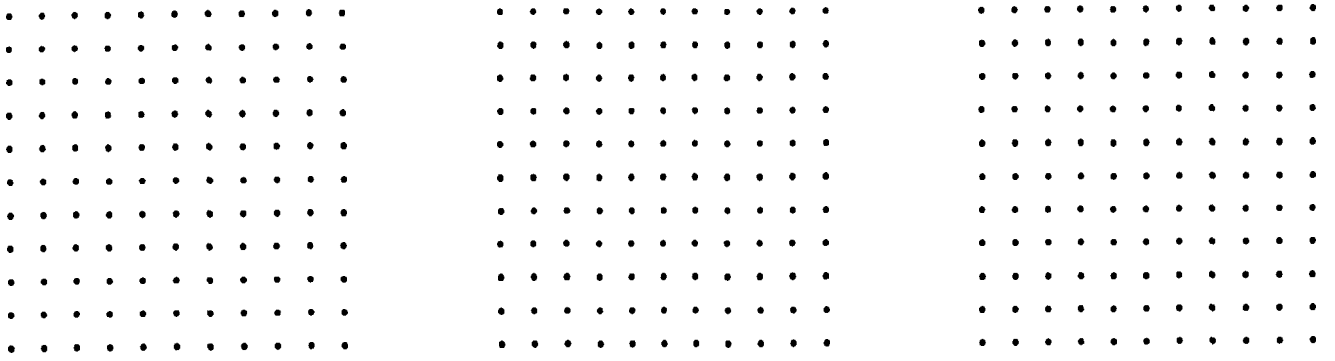
7.If another class would like to make a quilt like ours, how could you explain the steps we used to produce the quilt? Be sure to explain what we learned about fractional parts of a whole. Write a letter to that class explaining the steps and what you learned about fractional parts of a whole. You may use the back of this paper to plan your letter. Write the final draft on the quilt paper provided. Be sure to include the five parts of a friendly letter.

Name: _____ Date: _____

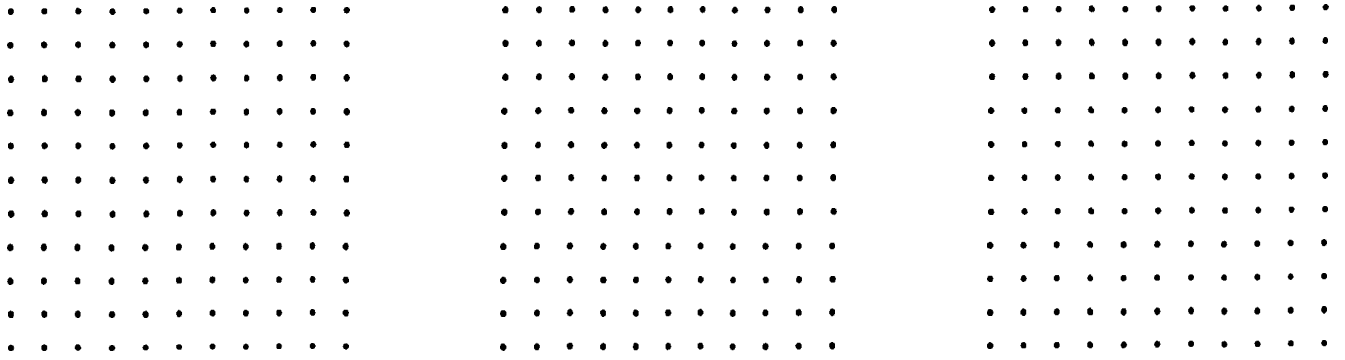
Show ½ in different ways.



Show fourths in different ways.

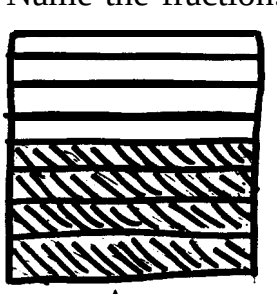


Show eighths in different ways.

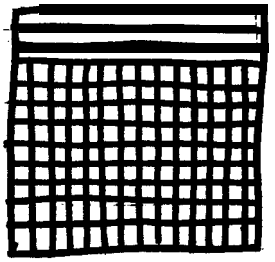


Name: _____ Date: _____

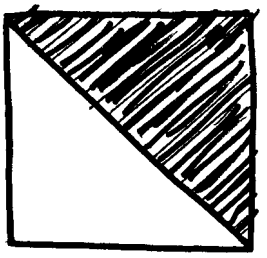
Name the fraction.



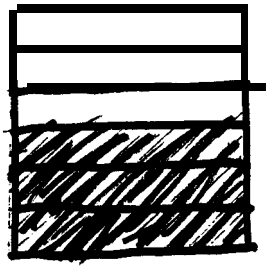
A_____



B_____



C_____



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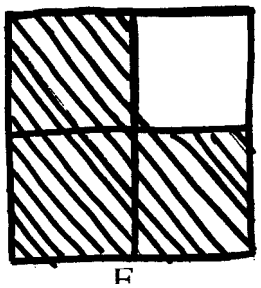

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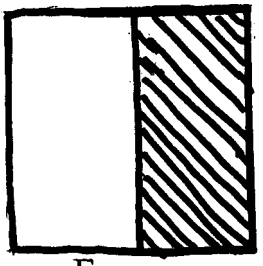

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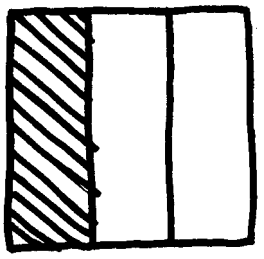

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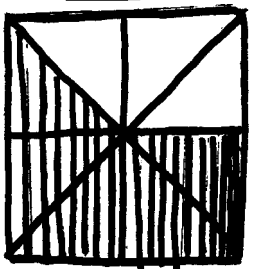


H_____--

In what way are A ,C, D, and F alike?

_____

_____

_____

Are any other diagrams alike?

_____

_____

Explain your answer.

_____

_____

Name: **Answer Key** Date: _____

Name the fraction.

A **4/8 = 1/2** B **9/12 = 3/4** C **1/2** D **3/6 = 1/2**

E **3/4** F **1/2** G **1/3** H **5/8**

In what way are A ,C, D, and F alike?

They are equal 1/2.

Are any other diagrams alike?

E and B are both 3/4.

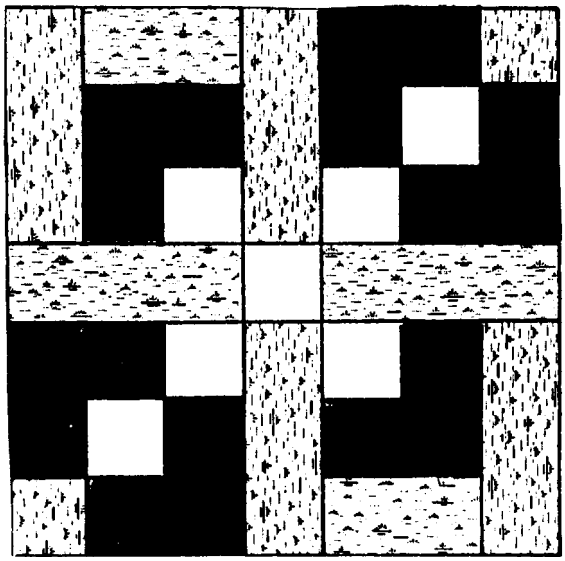
Explain your answer.

9/12 is an equivalent fraction to 3/4, therefore, there are both equal.

Student Resource Three

Name: _____ Date: _____

Performance Assessment



1. Look at the quilt block and estimate what fractional part of the whole square each color represents.

_____

_____

_____

_____

2. Justify your estimation:

_____

_____

_____

_____

3. Using geoboard, tiles, or graph paper calculate the actual fractional part each color represents.

_____

_____

_____

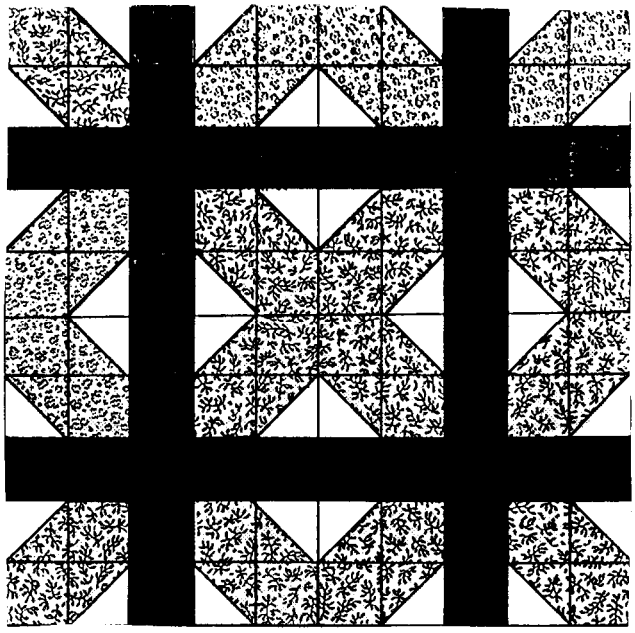
4. Write a number sentence to show how the fractions combine to form the whole.

_____

5. In the space provided make a bar graph to demonstrate the fractional part of the whole that is represented by each color. Be sure to include a title and label the graph correctly.

Name: _____ Date: _____

Performance Assessment



6. Look at the quilt square, if each small square cost $0.10 calculate the value in dollars and cents for each color. What would the total cost of the quilt be? Use a number sentence to show how you got your answers.

	cost	Number Sentence
Red		
White		
Blue		
Green		
Total cost		

7. Ifanother class would like to make a quilt like ours, how could you explain the steps we used to produce the quilt? Be sure to explain what we learned about fractional parts of a whole. Write a letter to that class explaining the steps and what you learned about fractional parts of a whole. You may use the back of this paper to plan your letter. Write the final draft on the quilt paper provided. Be sure to include the five parts of a friendly letter.